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WHAT'S THE DIFFERENCE??

Ross McKenzie and Dan Heaney

There is no shortage of new ideas out there. The farm press is constantly bombarding you with an array of new products and management practices. On top of that there are all the ideas for improvement that crop up in your own mind. If you are a progressive farmer, you are constantly asking yourselves "will adopting this new practice increase my profits?" To answer this question, you need information on how the new practice affects yields and production costs.

Generally there are at least some research results to back up claims about new products or practices, but they don't tell you how it will work on your farm. To get this farm specific information you must perform some sort of trial or experiment in your own fields. If done correctly, these home grown experiments help us make good decisions about our management system. If done poorly, the results can mislead us in two ways. We might adopt a new practice that has a negative effect on our profits or we might decide not to adopt a new practice that would have increased profits.

The simplest on-farm trial has only two treatments: the new system, which includes the innovation, compared to the current system, what you have been doing. The two systems should be set out side by side in a field. The size of each treatment might range from one to 40 acres, but size is not crucial and bigger is not always better. What is important is to maximize the contact edge between the two systems. For example, results will be more reliable from long skinny treatments laid out side by side than from plots of the same area that are square.

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Copper Fertilizer : Source, Rate, Method of Application

Elston Solberg
Research Agronomist

Four years ago Dan Schroeder had a problem. Farming just north of Tofield, Dan had noticed fairly large areas of poor growth in his wheat crops for a number of years. Several agronomists had looked at the problem. There had been various diagnoses, but no cure.

The problem was most obvious later in the growing season. As the crop started to ripen, darkened areas would start to appear. On closer examination, the darkening proved to be stem melanosis, a fungal disease of cereals. Infected plants produced shrivelled kernels or no kernels at all.

In 1989, district agriculturists Tennis Marx and Ross Hutchinson visited the field. They noticed that the poor growth was most dramatic on Dan's deep black sandy soils. Based on some recent diagnostic information from Alberta Agriculture's Soil and Crop Management Branch they suspected copper deficiency. The soil tested marginally deficient in copper (0.6 ppm), but it was the combination of factors - melanosis, black sandy soil, marginal soil test, heavy manure use - that clinched the diagnosis.

In the spring of 1990, Soils Branch started a cooperative research trial in one of Dan's fields. Backing our efforts with financial and professional support were Andrukow Farm Sales, Sherritt Fertilizers, and the Alberta Agricultural Research Institute.

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Alberta Agriculture

Difference Continued

Sometimes on-farm trials are made more complicated by using several different treatments of the new practice. Don't let them get too complicated. Simplicity is the best approach. As a rule of thumb, three treatments should be your maximum number of treatments in an on-farm trial.

The primary purpose of trialling is to provide information that will allow you to make an informed decision. From the observations and data collected, generalizations about the practice are made using common sense and deductive reasoning. This is all very well if yield differences between the two treatments are large. Unfortunately, yield differences are often small. Also, most questions can rarely be answered with 100% certainty. Therefore, some caution is needed when making generalizations and arriving at conclusions based on results of on-farm strip trials.

Statistics provide an objective basis for determining if real differences exist between treatments. Most of us have difficulty appreciating how variable crop yields can be even across seemingly level, uniform fields. For example, if you harvest two equal areas of a wheat field, the yields will not be exactly the same. Almost everything that effects crop yield - sunlight, nutrients, water, temperature, weeds, disease, insects - changes from point to point across the field. In trialling, the difference between treatments that arise from this natural variation are called experimental error.

By recognizing this natural variability, we also recognize the difficulty in evaluating a new practice on the basis of a single observation. When we compare a new method with an old method we must have more than one replicate, otherwise we can never be sure if the differences were a result of the method or natural variation. With a replicated trial you can tell what portion of the difference between treatments is actually a result of the treatment and what portion is experimental error. Remember an experiment that only has a single replicate cannot provide a reliable measurement of treatment differences.

Researchers overcome the problems of natural variation by repeating or replicating each treatment three or more times. Then statistical tests of significance can be applied and an unbiased estimate of treatment differences made. Farmers and agricultural specialists must also take into account experimental error when conducting on-farm trials. By replicating, the risk of making a bad decision are minimized. The greater the number of replicates, the more confident you can be that the results either positive or negative are not just a "fluke". When it comes to yield, let's make one thing perfectly clear. ***You cannot make meaningful comparisons between treatments without replication.***

If you are considering conducting on-farm trials this spring, I have a booklet called "Guide to on-farm trialling" that would make excellent reading before you get started. It includes information on establishing objectives, developing a plot plan, site choice, trial establishment, monitoring trials, harvest management, methods of weighing yields and analyzing results. If you would like a copy give me a call at 381-5126 in Lethbridge or call Dan Heaney at 427-6361 (RITE 147-6361) in Edmonton. ❑

ORGANIC FARMING

Ieuan R. Evans

Whether we agree or disagree with organic farming it's here to stay. In a world of food surplus and growing emphasis on health and fitness, the lifestyle choice that organically grown food is somehow better for you is being converted into consumer preference. There's no point to opposing this approach, pretending it doesn't exist or hoping that it will eventually go away. Let us face up to reality and recognize organic farming as an alternative method of food production. Just like deep ploughing , minimum till, zero till, soil conservation, sustainable agriculture, ICM, MEY, and a host of other concepts, recognize it as another facet of crop production. We should look at the organic movement as clients who are trying to develop a saleable product. As such they are entitled to our help. We should quit telling them that they are wrong or misinformed and start helping them to sort out the confusion and develop their industry.

One continuing area of confusion is what classifies as organic or non-organic. Is an organic pesticide natural? Crushed rock or bonemeal are sources of phosphate but coming from a fertilizer company are they unnatural? Not to mention where the phosphate in bonemeal originated or what the animals were fed. There are likely as many definitions of organic as there are organic growers.

For the backyard grower, a personal definition of what constitutes organic is not a serious problem. But commercial growers trying to service the organic market can't afford the luxury of a personal opinion. They need a clear definition of what qualifies as an organically grown crop so they can adjust their production practices accordingly. In North America there are literally hundreds of "organic" farm and horticultural organizations, each with their own "rules" and "regulations" pertaining to food production. A lot more work is required to synthesize this diversity into a comprehensive set of production and marketing standards.

Remember it's market farmers that essentially govern crop production. For many, diversifying and finding a market niche will be the difference between solvency and bankruptcy over the next decade. If farmers can make a living growing organically and backyard gardeners have fun, why not help where possible. ❁

Copper Continued

The project was designed to address three questions: Do I broadcast, band, or drill with the seed? Do I apply copper every year or every few years? What copper fertilizer is the best performer?

In order to answer these questions we set up various combinations of treatments using three products Copper Chelate (7.5% copper), Copper Sulphate (25% copper) and Micromate 155 (15.5% copper). Copper chelate was applied as a liquid spray, copper sulphate as crystalline Bluestone (not blendable) and MicroMate 155 as a blendable granular. We used annual rates ranging from a quarter to one pound per acre and compared them to one time rates of one to three pounds per acre depending on the product. We also tried different application methods: foliar, surface applied (liquid broadcast), broadcast, banded, and seed placed. After three years we have some answers and a whole new set of questions.

If you follow down the 1992 column in the attached table, you'll notice that for each product there is at least one yield increase over 12 bushels per acre. This is good. It suggests that all three products were effective in increasing yields. However, in some cases 2 or 3 years were necessary before they became fully effective, but you do get your money back eventually.

Continued Page 4

Response of Park Wheat to Copper Applications Near Tofield, 1990 to 1992.

		Application		Yield			
Copper Source	Rate	Method	Frequency	1990	1991	1992	Average
	(lb/acre)				(bu/acre)		
Check	Nil	None	None	45	41	46	44
					Yield Increase		
Copper Chelate	0.25	Foliar	Annual	5	1	0	2
	0.50	Soil Spray	Annual	3	5	14	7
	1.00	Soil Spray	One Time	13	20	11	15
Copper Sulphate	1.00	Broadcast	Annual	11	17	15	14
	3.00		One Time	15	20	15	16
	1.00	Banded	Annual	0	11	8	6
	3.00		One Time	5	3	8	6
	1.00	Seedrow	Annual	2	13	15	10
	3.00		One Time	5	17	14	12
Micromate 155	1.00	Broadcast	Annual	1	17	14	11
	3.00		One Time	2	13	9	8
	1.00	Banded	Annual	3	6	5	5
	3.00		One Time	3	11	10	9
	1.00	Seedrow	Annual	1	3	7	4
	3.00		One Time	-3	4	2	1

Copper Continued

The table also shows that some combinations of product and method of application never seem to reach full potential. The problems of delayed response or poor response are likely due to lack of contact between the fertilizer and the plant roots. For MicroMate 155, banding at the one pound copper rate puts down one to two granules of fertilizer per foot of band. The distance between granules in the seedrow is even larger. The chance that each plant in that square foot getting a root close enough to a granule to absorb the required copper is small. This may be further complicated by chemical factors in the case of Micromate 155 where half the copper is in the sparingly soluble oxide form.

Copper sulphate comes in a wide range of crystal sizes. Thus the number of crystals put down in a given square foot varies. Basically the finer the crystal size, the more evenly distributed and available is the copper and the more difficult the copper sulphate is to handle. Conversely, as crystal size increases the ease of handling is improved but distribution and availability is diminished, at least in the short term. It is important to note that in our research trials we tend to use quite fine materials.

Over the course of the experiment diffusion, tillage and further additions of fertilizer in the case of the annual applications mixed copper more evenly through the soil. By year three, differences between products and application methods start to disappear.

Some general tactics for copper management fall out of the Tofield study. If a field is very copper deficient, the first application should be broadcast. Use copper chelate or copper sulphate. If you want to be really sure double the annual rate and apply in the fall before any tillage operations. Remember mixing is important.

After the first year, your options open up. You can let the crops live off the residual for a year or two if you used a high rate or continue with a low annual rate. Method of placement, with the exception of foliar, is not likely to be a limiting factor after the first year. Once you have applied three to four pounds in a two to three year period, the residual benefits should last at least 2 to 3 years.

A further word on the strengths and weaknesses of different products. Copper Chelate comes as a liquid and is probably the easiest to apply evenly. Our data suggests that you may have to go slightly higher rates to cover off the immediate deficiency, but you get good residual coverage. On a per pound of copper basis Copper Chelate is the most costly and is often difficult to find on short notice.

Copper sulphate is generally the cheapest and can be applied in either granular or liquid form. It is however the hardest to handle. It is hydroscopic and thus cakes up quickly in granular form. This also makes it difficult to blend. I have seen several wrecks were it was blended with urea. The resulting product had the consistency of well cured concrete. I strongly suggest that any blending experiments be carried out in a bucket or some other small vessel your not terribly attached to. Copper sulphate is also a strong oxidant and will corrode equipment. So clean your equipment thoroughly after use. If you intend to spray copper sulphate be warned that any brass or galvanized fittings in your system will deteriorate extremely quickly with much leakage, breakage and swearing!!

MicroMate 155 appears to be a little slow out of the gate. However, you can blend it with other fertilizers. Because of its relatively large granule size and high copper concentration, MicroMate 155 can adversely affect germination when seed placed. (NOTE: This would also be true of large crystalline copper sulphate.) MicroMate formulations containing other micronutrients are also available, making it suitable in those rare instances where more than one is deficient.

What's the perfect copper fertilizer? So far there isn't one on the market. I think if 1 to 2% copper could be incorporated in some of the regularly used nitrogen or phosphorus fertilizers the resultant product would allow for even copper distribution with little or no seedling sensitivity problems and would be effective if broadcast, banded or seed placed. This idea likely rules out physical blends. Maybe a dash of copper in one of the liquid fertilizers. As copper deficiency becomes more widespread on a world basis maybe we'll see some new products on the market. Until then make the best of what's available because wisely used a penny goes a long way. ❍

SOIL & CROP MANAGEMENT UPDATE
Ellerslie Rugby Club, Feb. 16 to 18, 1993

This update is designed for agricultural extension personnel, teachers, technicians, students, farmers and other people interested in the latest on pesticide, soil conservation and fertility research and technology. Topics include: direct seeding management, an overview of the recently completed canola and barley surveys, hands-on weed identification, herbicide resistance issues, field tested biotechnology, blackleg in canola, stripper header development news, the latest in weed issues and a bevy of other topics.

If you would like to attend please contact Denise Maurice at 427-2530 and we'll see you there!!

ALBERTA SOIL SCIENCE WORKSHOP
The Edmonton Inn
February 22 to 24, 1993

This is the 30th annual workshop bringing researchers, extension specialists, industry agronomists and farmers together to share the latest information about soil fertility, conservation, reclamation, inventory and survey. This years' theme, ***Research, Education and Extension,*** features speakers from across the prairie provinces and beyond.

For more information about registration for these important meetings contact Alberta Agriculture's Len Kryzanowski at 427-6361 or 427-1439 (FAX).

LEAFY SPURGE GETS BUGGED

Dan Cole
Soil & Crop Management Branch

Leafy spurge is a big problem in some areas of North America. Millions of dollars have been spent on control and research on control of leafy spurge in the United States. In fact, a symposium is held each year just on leafy spurge and "Leafy Spurge News" is a newsletter that is published out of North Dakota State University two or three times a year. Leafy spurge is big time.

Even though leafy spurge is not as big a problem in Alberta (do not get me wrong, it is a problem here and a big problem for those who have to contend with it _ about 15,000 acres of leafy spurge in Alberta) we may be ahead of the Americans on biological control of leafy spurge.

Leafy spurge is a persistent perennial weed that is found on public and private pasture, rangeland, right of ways and other uncultivated land in central and southern Alberta. The problem with leafy spurge is that cattle will not touch the stuff and will avoid grazing areas where it is present. It competes with the grass and other desirable vegetation and is very difficult and costly to control with herbicides. It just keeps coming back.

Like so many of our weeds, leafy spurge was a gift from Europe. It came with settlers' seed or hay but the natural enemies of leafy spurge (the insects and diseases that keep it in check in Europe) did not accompany it to North America. Thus leafy spurge spread and grew unabated here. Biological control is just playing catch-up. The natural enemies that feed on leafy spurge in Europe were collected, screened very carefully to make sure they would not affect any of our native or crop plants here and then brought to Canada for more screening as well as test to see if they would survive our climate. Agriculture Canada was instrumental in getting this screening work done.

Two insects passed the tests with flying colours (although they like to hop) and now are here in Alberta having a banquet on a number of leafy spurge infestations.

The black dot spurge beetle came from Hungary in 1983 for an initial release near Cardston. It did so well there that over 96,000 beetles have been collected and redistributed from Cardston and a couple later release sites to over 260 different leafy spurge infestations in the province. Of these 260 release sites, approximately 65% or 170 of them have had successful establishment of the beetle. The black dot spurge beetle will survive and do better on higher, drier and more exposed (south facing slopes are ideal) leafy spurge patches where the soil is sandy or gravelly with low organic matter.

The copper spurge beetle came from Italy in 1983 but it has not built up in numbers as quickly as the black dot spurge beetle. Over the last several years approximately 14,000 copper spurge beetles have been redistributed at 29 sites in Alberta with 59% successful establishment. This beetle prefers moister, less exposed leafy spurge infestations on sandy soil. Good sites are often low lying spots near trees, bushes or water bodies.

The type of release site is critical to survival and how well the beetles do on leafy spurge infestations. If the site is not right for the type of spurge beetle, they may as well not be released there. If the site is suitable, the beetle will usually start to build up in population and there will be a reduction in the number of flowering leafy spurge shoots, usually in a 1 to 5 metre radius around the release point, within a year. It usually takes three to five years for the beetle population to build up enough to spread over a larger area. Spurge beetles will not totally eradicate leafy spurge (eat themselves out of house and home) but can reduce the spurge population by as much as 95%. Even then they will not move onto native or cultivated plants to harm them.

Both spurge beetles mainly affect leafy spurge by feeding on the roots as larvae. The adults will feed on the leaves but this has a lesser effect on the leafy spurge. The adult spurge beetle emerges between early June and mid-July and mate to lay up to 450 eggs per adult female in the soil beside the leafy spurge roots. The eggs hatch about three weeks after being laid and the larvae to continue to feed on the roots into the late fall when they build overwintering cells in the soil and become dormant. The larvae pupate in the soil in the spring and emerge as adults about three weeks later.

The spurge beetles are collected for redistribution as adults, using sweep nets. Since they are only about twice the size of an alfalfa seed and can climb, hop and fly, the container they are transported in must be tightly sealed. The spurge beetles are usually transported with ice to protect them from over heating.

There have been four redistribution clinics over the last two years to provide spurge beetles and training to those who wanted to try them. Please contact Dan Cole, Soil and Crop Management Branch, Alberta Agriculture, phone, 427-7098 or Chuck Richardson, Range Management, Public Lands, phone 464-7955, if you would like to obtain either black dot spurge beetles or copper spurge beetles. For Further information on biological control of leafy spurge contact Dr. Alec McClay of the Alberta Environmental Centre, Vegreville, Phone, 632-8207 or Dr. Peter Harris, Agriculture Canada Research Station, Lethbridge, phone 327-4561. ✡

We look on a man as foolish, who says he is so busy chopping wood that he never has time to sharpen his axe.

- Author Unknown -

Farming in the Future

"May you live in interesting times" - Ancient Chinese Curse

Agriculture and everyone in it is certainly living under the curse. Where is this cursed existence taking us? The editors of SOILutions thought it would be fun to ask a few of the crystal ball gazers around the department to provide some well reasoned ideas (or maybe some wild speculation) on where present trends will take us in the future. We will run Farming in the Future as a regular column for at least a couple of issues. If you want a particular topic's fortune told, let us know.

We have been told that we are seeing the dawn of the information age. What does this mean for farming? It means that farmers are going to have to learn to keep track of and use huge amounts of information or be left behind in terms of competitiveness and profitability. Information about markets, regulations and production practices will have to be integrated into a farm management system that makes the best use of the natural and human resources on your farm.

One of the biggest changes will be in the way we divide up the land into management units. At present the basic management unit is the quarter section. A square of land that gets treated as if it were the same from fence line to fence line. But we know it is not the same. A quarter section can contain several different soil types. It has high and low yielding areas. Wet and dry spots. In the not too distant future, you will be able to farm a quarter section as a series of soil-landscape units. Management decisions such as fertilizer and pesticide applications will be tailored to optimize profitability and minimize environmental risk on each unit.

Two emerging technologies will make landscape farming a reality. The first is Geographic Information Systems (GIS). All GIS does is allow you to take different kinds of information about points in the landscape, for example soil moisture, topography, organic matter, available nutrients, salts, and overlay and manipulate them in a computer. GIS will be your mapping system. It will keep field records. It will help you develop landscape management systems and check to see if they are working.

The second technology that will revolutionize farming is satellite based radionavigation systems. The Global Positioning System (GPS) currently being deployed by the United States is an example of such a system. Perhaps you have seen the advertisements by SONY for their hand held unit. At a cost of approximately two thousand it can tell you where you are on the surface of the planet plus or minus 20 meters.

More expensive portable receivers, with a little help from a second fixed receiver, can use the GPS satellite system and tell you where you are plus or minus half a metre latitude, longitude, and altitude. This approach is called DGPS, D for differential. The second receiver is necessary to correct the noise the military places on the satellite transmission. Experts expect that the cost of these units will be down below five thousand within three years.

How will landscape farming work? Let's use the example of fertilizer application. First you would go out and divide a quarter section into soil-landscape units. This will take some outside help in the areas of soil mapping and involve some fairly intensive one time only soil sampling to characterize the landscape. Next you use GIS on your home computer to integrate the landscape information, divide up the field into soil-landscape units, and develop management plans for each unit.

Come seeding time you hook a receiver on your tractor and GPS will tell you exactly where you are in your field. An on-board computer will take the positional information and the landscape management plans and tell your fertilizer applicator how much to apply. You roll back and forth across the field like always, but now your optimizing inputs on six, eight, ten landscape units in each field. A little more phosphorus on the eroded hill tops, a little less nitrogen in the dry spots where moisture is limiting, add some potassium through those sandy areas.

Three months later comes the kicker. Your combine is hooked into the GPS. Grain monitors are measuring the yield on the fly. The on-board computer is matching field position and yield. Back home after the crops in the bin, you can spend your winter evenings looking at the input-yield patterns. What worked and what didn't. Where in the field did you make money, where did you break even and where did you lose. What are you going to try next year to make the losers into winners.

This latter bit, measuring crop performance, is where the power lies in this approach. Your entire farm becomes your own private research trial. The research goal? To find the management system that's best, not for the research station fifty kilometres down the road, but best for the fields you farm. For example, I am suspicious that there are areas in some of your fields that don't turn a profit in grains and oilseeds. You fertilize, you seed, you spray, you harvest and the crop you take off in some parts of the field is worth less than the input costs.

Manage a field using the landscape method and in a few years you would not only know where exactly those areas are but how much it is costing you to keep them in production. So take the profit stealers out of grain and oilseed production. Put them in grass, grow trees, let a yuppie build a house on it. The idea is to identify and farm only those areas of the field that are capable of making you a profit and optimize your profit on those areas.

Where will landscape farming lead us? I think that given a hundred years it will not only change the way we farm fields, it will change the face of the rural landscape. Soil-landscape units don't stop at fencelines. So gradually as

farmers realize that there is money to be made in reconfiguring fields, the square patchwork of quarter sections will give way to a crazy quilt of shapes and sizes.

Parts of fields currently in arable agriculture will be taken out of production and put to alternate use. I suspect that this will go hand in hand with a trend towards more rural residences. Mixed farming will also make a comeback. Farmers will realize that there are areas in almost all landscapes where livestock are either more profitable or more sustainable than arable crops.

I also think that farms will get smaller. The last one hundred years has seen the growth of technology that makes it possible to farm extensively. In economic terms farming went from being labour intensive to being capital intensive. It was the age of economics of scale. Big farms, big equipment, low margins per acre. We are now entering an era when farming will transform from being capital intensive to being information intensive. The size of your tractor won't be as important as the size of your database. Increased profits for the individual farmer will not come from farming more land but from farming less land more effectively.

One last thought and it's kind of a wild one. If you started landscape farming tomorrow, in twenty years from now your landscape data base would be worth something. In fifty years from now, the price we pay for farmland will not only reflect the quality of the land but the quality of information associated with that land. ✈

TO PLOW OR NOT TO PLOW

Jerome Lickacz

Deep plowing has caught the imagination of many farmers who farm land containing organic (peat) soils. The peat occurs in depressional areas and often these areas are "sacrificed" in the interest of being able to farm a field as a unit. Tillage, crop and variety selection, fertilization, weed control and harvesting are determined on the basis of what is considered best for the mineral soil.

In 1986 the former Soils Branch established two deep plowing trials in cooperation with the Northwest Peat Soil Association and district extension staff. Initial results were inconclusive. The plow used in these trials was designed for use in Solonetzic soils. As a result the depth of plowing was only about 24 inches, to shallow to bring up the mineral soil and mix it with the peat.

In 1987, a simulated deep plowing trial was established on a farm owned by Clarence Olthius at Neerlandia. Deep plowing was simulated by removing a layer of peat and replacing it with mineral soil. Treatments included a 6 inch and a 12 inch deep replacement layer as well as two mixed treatments, one being a 90/10 mineral/organic mix and the second a 70/30 mix. Both mixed treatments were calculated on a weight basis. A check plot in which the organic soil was left undisturbed was also included in the design. Results showed that addition of mineral soil as either a layer or as a mix substantially increased crop growth. Little difference occurred between treatments.

Other trials have shown that organic soils are generally deficient in copper. To determine if increased yield was due to improved physical quality or to changing fertility regimes, each treatment was split and two applications of foliar copper were made, the first at the four leaf stage and the second at the shot-blade.

Wheat, Deep Plowing and Copper

Treatment	Wheat Yield (bu/ac)	
	No Copper	Copper
Check	7	44
Six inch	55	54
Twelve inch	62	64
90/10 mix	68	72
70/30 mix	57	62

Comparing the check with and without copper to the simulated deep plow treatments (see table) suggests that much of the benefit from deep plowing may be due to the mineral soil improving copper fertility. However, the simulated deep plow treatments yielded from ten to twenty-eight bushels more than the copper treated check. It would seem that the simulated deep plowing benefited crop growth in ways other than just copper fertility For example, a better seedbed resulting in more rapid germination and stand establishment. The soil also thawing and warming more rapidly when the mineral component of the soil was increased.

You don't need fancy economics to figure out that deep plowing is an expensive way to improve copper fertility in organic soils. We need to continue our research and try to further separate the physical from the fertility benefits. Then will know when adding a pound or two of copper is the right choice and when the more expensive deep plowing will pay its own way.

FEEDBACK FROM THE FIELD, Does changing tillage practices change Pest Problems?

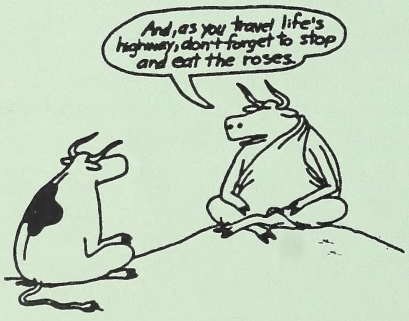
Dr. Dan Johnson is a Research Scientist with Agriculture Canada in Lethbridge. He recently wrote Soilutions asking for help from our readers in gathering information .

I am looking for information that you or the readers of SOILutions may have. A number of DA's, fieldmen and producers have phoned me with questions about the effects of reduced tillage on grasshoppers. For example, there have been reports that grasshoppers have increased on chem fallow fields more that on nearby conventional fields, but there is no solid proof of any relationship yet. Insects that spend part of their lives in the soil will be affected by changes in tillage practices (grasshoppers and cutworms are good candidates), and I would like to test what the effects will be and test some possible ways to respond. It may be that we could identify changes in timing or rates of insecticide applications, or develop biological methods of control, that could offer solutions without increasing producers' insecticide costs or crop losses.

I am interested in hearing from growers and other about how reduced tillage has affected their insect problems, whether increase, decrease or no change. It would help me to know the year, location, kind of insect, type of crop, and general method of management of the fields that were affected (rotation, tillage, and so on). I am also interested in the possibility of a network for surveying insects according to tillage practices. This is an area that may require research.

Dan Johnson

Dr. Johnson can be reached at Agriculture Canada, PO Box 3000 Lethbridge. T1J 4B1. Phone 403/327-4561 or fax 403/382-3156.



Cow philosophy

Dr. Johnson's questions concerning the effects of reduced tillage systems on grasshoppers are part of a larger question. In addition to grasshoppers, there are reports that Hessian fly, wheat stem sawfly, perennial weeds, and plant diseases such as scald have increased in reduced tillage, chem fallow, or direct seeded fields compared to fields under conventional tillage.

Soil and Crop Management staff would like to broaden the scope of Dr. Johnson's inquiry. We want to hear from farmers, industry representatives and anyone else who has experience or a view on how reduced tillage practices have affected pest problems, whether increase, decrease or no change. The more specific the details with respect to location, kind of pests, types of crops, and management the more useful the information.

We think developing a nework for monitoring pests according to tillage practices is a excellent idea. Information gained will help in resolving problems and coordinating research on this subject.

If you want to provide feedback or join the network call Dan Johnson (insects) at 403/327-4561 Lethbridge , or Michael Dolinski (insects), Denise Maurice (weeds), or Ieuan Evans (plant diseases) in Edmonton at 403/427-7098.

Michael Dolinski, Section Head
Entomology and Rat Control

Editors' Note: Soilutions will publish a summary of feedback from the field on this topic in a future issue.

Alfalfa Facts

Soil and Crop Management Branch has just published a new fact sheet, "Agdex 561-18, Fertilizer Requirements of Irrigated Alfalfa." Copies are available from the Print Media Branch, Alberta Agriculture, 7000 - 113 Street, Edmonton T6H 5T6 or Alberta Agriculture's District Offices.

SOILutions is published three times a year by the Soil and Crop Management Branch, Alberta Agriculture. Your comments on current contents, ideas and contributions for future articles are welcome. For further information phone, fax, or write *Dan Heaney*, Soil and Animal Nutrition Laboratory, 6909-116 st, Edmonton, Alberta, T6H 4P2, Phone (403) 427-6361, Fax (403) 427-1439 **OR** *Elston Solberg*, Agronomy Centre, 6909-116 st, Edmonton, Alberta, T6H 4P2, Phone (403) 427-2530, Fax (403) 422-9745.